PB86-133873

Superfund Record of Decision (EPA Region 5)
Wauconda Sand and Gravel
Wauconda, Illinois, September 1985

(U.S.) Environmental Protection Agency
Washington, DC

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U.S. Department of Commerce
National Technical Information Service
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Emergency and
Remedial Response

EPA/ROD/R05-85/027
September 1985

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EPA

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16. ABSTRACT

The Wauconda Sand and Gravel Landfill site is located in Lake County, Illinois, approximately two miles north of the Village of Wauconda. The 74-acre site is comprised of a 43-acre unpermitted landfill, a nine-acre permitted landfill, nine acres which are excavated but unfilled, and 13 acres of perimeter site area. Before 1950, the site property was used as a sand and gravel pit. From 1950 until 1977, Wauconda Sand and Gravel Company operated the northern portion (43 acres unpermitted fill) of the site as a landfill. Landfill operations during this period consisted of dumping refuse into the mined-out gravel pit. The refuse deposited at the landfill consisted of residential garbage, construction debris, some industrial sludges and drums with undetermined contents. In 1980, a private well adjacent to the eastern boundary of the landfill was sampled by Illinois Environmental Protection Agency and inorganic, organic and PCB contamination was detected. Additional investigations concluded that PCBs, metals, and organics were contaminating the ground water and surface water (Mutton Creek).

The selected remedial action for this site includes: installation of leachate collection drains to stop surface leachate discharge into Mutton Creek; providing for proper disposal of leachate (either at the Wauconda Sewage Treatment Plant, or a hazardous waste treatment facility in accordance with Agency policy); regrading settled
(see attached page)

17. KEY WORDS AND DOCUMENT ANALYSIS		
a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Record of Decision Wauconda Sand & Gravel, IL Contaminated Media: gw, sw, soil Key contaminants: inorganics,organics, PCBs, metals		
18. DISTRIBUTION STATEMENT	19. SECURITY CLASS *(This Report)* None	21. NO. OF PAGES 49
	20. SECURITY CLASS *(This page)* None	22. PRICE

depressed and eroded areas on the existing landfill soil cover with sufficient slope to promote rain runoff; revegetating bare and eroded areas to prevent erosion of soils into Mutton Creek; and fencing. This operable unit only addresses leachate discharge to Mutton Creek; ground water decisions are being deferred until additional RI/FS work is completed. Total capital cost of the selected remedial alternative is estimated to be $1.6 million with annual O&M costs of approximately $50,000 for a 30-year period.

Record of Decision
Operable Unit Remedial Alternative Selection

Site: Wauconda Sand & Gravel Landfill, Wauconda, Illinois

Documents Reviewed:

I am basing my decision on the following documents describing the analysis of cost-effectiveness of remedial alternatives for the Wauconda Sand & Gravel site:

- Wauconda Sand and Gravel Remedial Investigation, Data Report
- Wauconda Sand and Gravel Remedial Investigation, Analysis/Development of Alternatives Report
- Wauconda Sand and Gravel Remedial Investigation Supplement
- Wauconda Sand and Gravel Feasibility Study
- Responsiveness Summary

Description of Selected Interim Remedial Measures:

- Install leachate collection drains to stop surface leachate discharge into Mutton Creek.
- Provide for leachate disposal at Wauconda sewerage treatment plant, if acceptable, or at a hazardous waste treatment facility in accordance with Agency policy.
- Regrade settled, depressed and eroded areas on the existing landfill soil cover with sufficient slope to promote rain runoff. This will eliminate ponding and reduce infiltration.
- Revegetate bare and eroded areas to prevent erosion of soils into Mutton Creek, and exposure of landfill materials.
- Construct a fence around the site to protect landfill cover and to prevent human contact with gas vents and leachate collection system.

Declarations:

Consistent with the Comprehensive Environmental Response Compensation, and Liability Act of 1980 (CERCLA), and the National Contingency Plan (40 CFR Part 300), I have determined that the interim remedial measures listed above for the Wauconda Sand and Gravel site are cost-effective, contribute to the protection of public health, welfare and the environment, and are a necessary component of the total remedy.

The State of Illinois has been consulted and agrees with the above listed interim remedial measures. In addition, the action will require future operation and maintenance activities to ensure the continued effectiveness of the remedy. These activities will be considered part of the approved action.

I have also determined that the action being taken is a cost-effective alternative for interim action when compared to the other remedial options reviewed. In addition, the off-site treatment of leachate is more cost-effective than other remedial actions, is protective of public health and the environment, and will be consistent with the final remedy.

Concurrent with the implementation of these interim measures, the U.S. EPA will undertake a supplemental remedial investigation/feasibility study to further evaluate the extent of ground water contamination and recommend an appropriate final remedy. If additional remedial actions are determined to be necessary, a Record of Decision will be prepared for approval of the future remedial action.

Sept. 30, 1985
Date

Allan Jerin (Acting)
Valdas V. Adamkus
Regional Administrator
Region V

Summary of Remedial Alternative Selection

Wauconda Sand and Gravel Landfill

Site Location & Description:

The Wauconda Sand and Gravel Landfill site is in the W 1/2 of the NW 1/4 of Section 24, T 44N, R9E of the 3rd P.M., Lake County, Illinois (Figure 1). The Site is about 2 miles north of the Village of Wauconda and about 3 miles east of the Village of Island Lake. The area was formerly used as a source of sand and gravel, then later used as a landfill. The 74-acre site is comprised of a 43 acre unpermitted landfill, a 9 acre permitted landfill, 9 acres which are excavated but unfilled, and 13 acres of perimeter site area. This site is bordered on the east by Garland Road, on the south by Bonner Road, on the north by Mutton Creek, and on the west by pasture and cropland (Figure 2). Mutton Creek drains into Island Lake, which is approximately 3-1/2 miles west of the site. Approximately 12 homes are located within one quarter mile north and east of the landfill perimeter. In addition, a residential development known as the Hillcrest community is located east of the site. There are approximately 100 homes in this development. The landfill itself is zoned within the municipal boundaries of the Village of Wauconda, the surrounding homes and Hillcrest community are not located within the city limits.

An estimated 5.4 million cubic yards of waste material are contained in the 43 acre unpermitted landfill. Nine acres at the southern part of the site was permitted by the Illinois Environmental Protection Agency (IEPA) as a sanitary landfill. Both the permitted and unpermitted portions of the site were closed in 1978 and clayey loam soil was placed on top. This site overlies two apparently separate aquifers in the unconsolidated (glacial drift) materials above bedrock. The upper 80 to 160 feet of these glacial soils consist mainly of a sand and gravel outwash deposit, referred to as the upper aquifer. Below the outwash (i.e. below the upper aquifer) there is a dense clayey to silty till layer that appears to be horizontally continuous beneath the site. The till layer is approximately 70 feet thick beneath the landfill's southern portion and 20 feet thick just east of the landfill's northeast corner. More sand and gravel outwash lie beneath the till layer and comprises a lower aquifer. Bedrock (dolomites and sandstones) underlies the lower aquifer at depths of 200 to 300 feet below the surface. Based on reported landfill bottom elevations, measured groundwater elevations, and ground surface contours, 40% of the total waste volume is estimated to lie below the water table in the upper aquifer. Most residents are believed to have wells in the deep drift aquifer, or in the bedrock aquifer(s), although some wells within 1/4 mile of the site are of unknown depth.

The site property is presently used for some recreational activities including rifle practice, model airplane flying and snowmobiling.

Site History

Before 1950, the site property was used as a sand and gravel pit. This pit covered a major portion of the present site and was excavated to an estimated maximum depth of 730 feet above sea level, which is about 40 feet below the shallow aquifer groundwater table and 40 to 80 feet below adjacent ground surface contours. Soil borings made at the landfill perimeter, geophysical test results, and IEPA reports indicate that waste materials were deposited in the landfill at and above the 730 foot elevation.

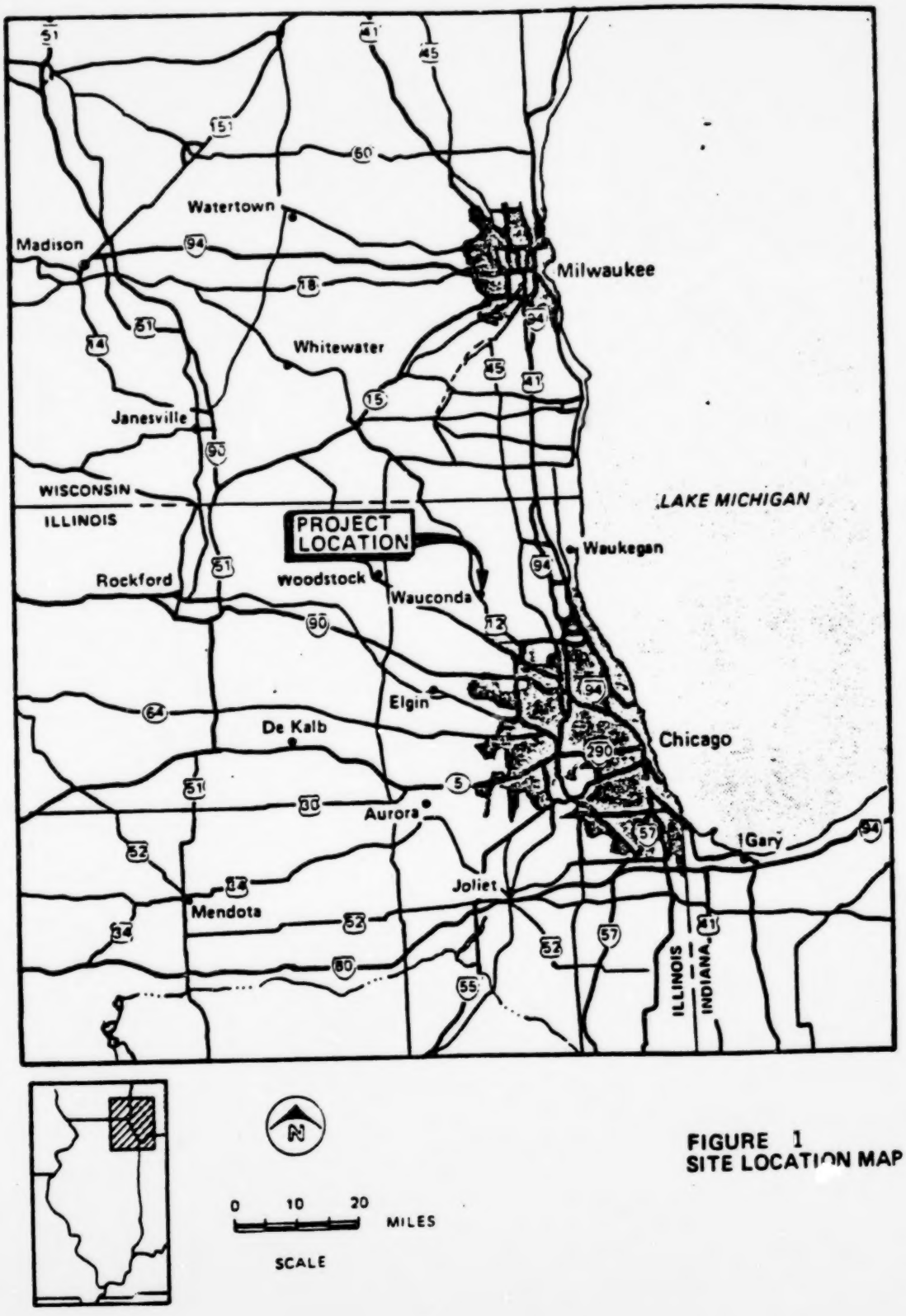


FIGURE 1
SITE LOCATION MAP

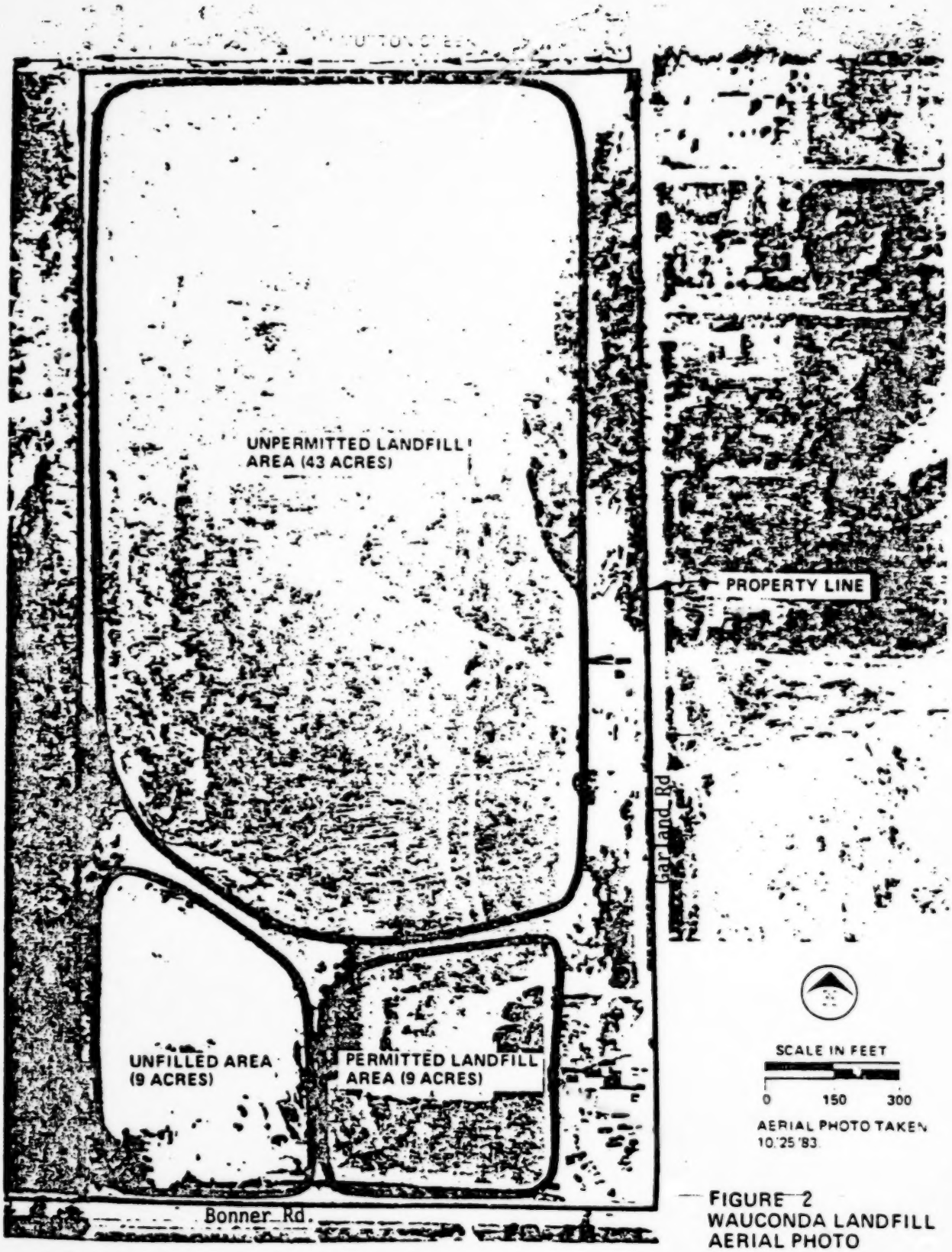


FIGURE 2
WAUCONDA LANDFILL
AERIAL PHOTO

Reproduced from best available copy.

In 1950 Wauconda Sand and Gravel Company was incorporated and from 1950 to 1977, operated the northern portion (43 acres unpermitted fill) of the site as a landfill. Landfill operations during this period consisted of dumping refuse into the mined-out gravel pit. No efforts were made to control leachate migration (e.g., by placing a liner in the bottom of the pit). The refuse deposited at the landfill consisted of residential garbage, construction debris, some industrial sludges and drums with undetermined contents.

In 1980, a private well adjacent to the eastern boundary of the landfill was sampled by IEPA and inorganic, organic and PCB contamination was detected. As a result, the well owner drilled a deeper well into an uncontaminated aquifer. Following this sampling the IEPA and the Lake County Health Department conducted additional monitoring of several water supply wells in the area, Mutton Creek (a creek on the northern boundary of the landfill) and several groundwater monitoring wells around the perimeter of the landfill. The investigations concluded that PCB's, metals, and organics were contaminating the ground water and Mutton Creek. In 1981, the Wauconda Landfill was scored at 53.42. The site was subsequently listed on the Nationa Priorities List, and designated for investigation under the CERCLA (Superfund) program.

Current Site Status

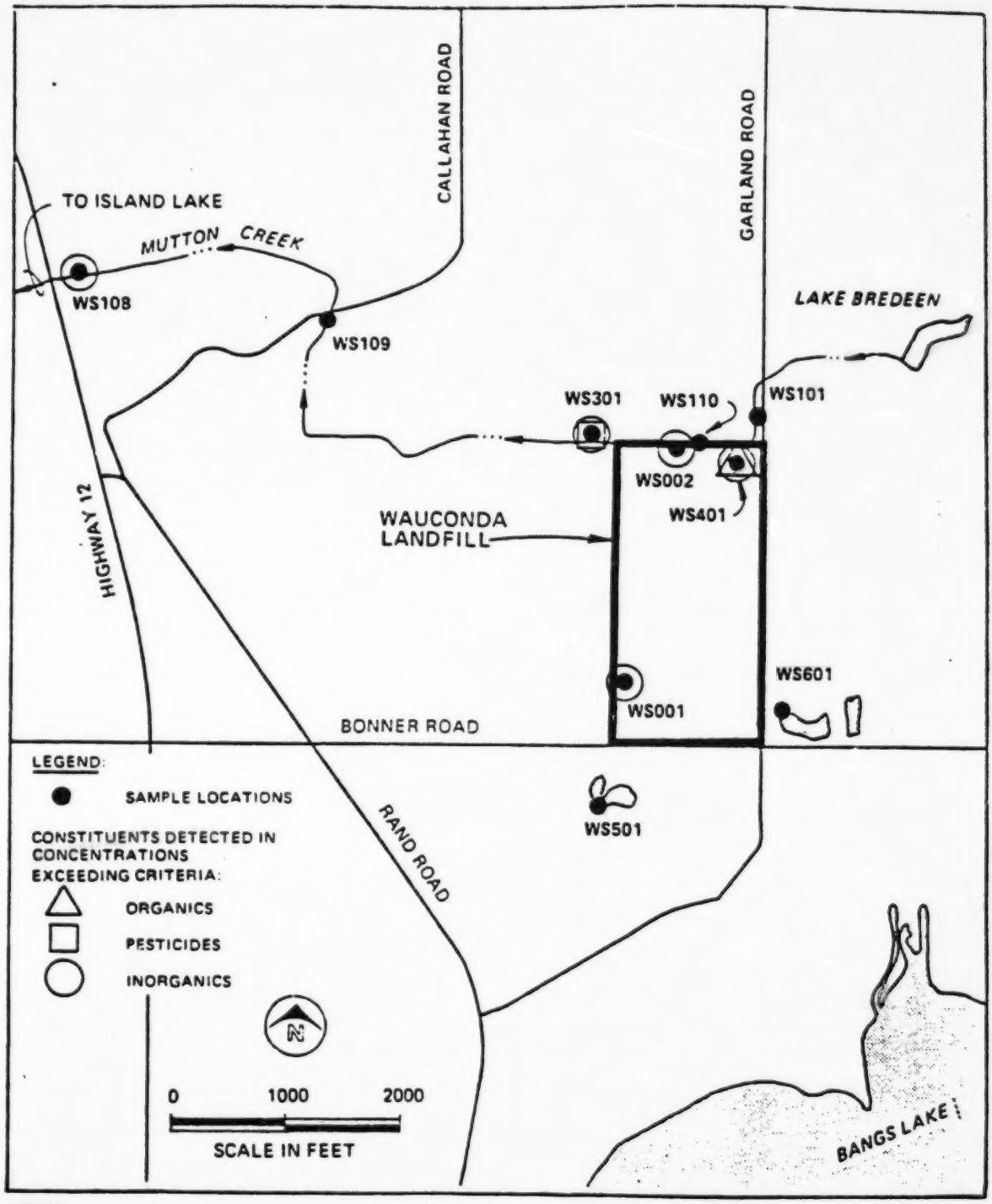
U.S. EPA conducted a remedial investigation in 1983 (Phase I), the results of which were released in the fall of 1984. Thereafter, the Wauconda Task Group (WTG), a group formed by several potentially responsible parties (PRP's) requested the opportunity to develop supplementary data. Both the WTG, by their consultants, Conestoga Rovers and Associates, and U.S. EPA performed additional investigatory work during the spring of 1985. This investigation included resampling of some existing monitoring wells (Phase II) and installation and sampling of eight additional monitoring wells (Phase III). These additional results were set forth by U.S. EPA in the Remedial Investigation Supplementary Report dated August 1, 1985. Conestoga Rovers also issued two reports dated May 1985 and July 1985.

A feasibility study completed in August, 1985 was intended for selection of an appropriate final remedy. However, because of the need to obtain further data to more accurately characterize the extent of ground water contamination and to predict possible future endangerment as the result of ground water contamination, a cost effective final remedy for ground water cannot be determined at this time, and additional RI/FS tasks are recommended. In as much as the remedial investigation has documented a release of hazardous substances from the Wauconda Sand and Gravel site into Mutton Creek via leachate seeps, the selected alternative recommends repair and maintenance of the existing site cap to eliminate this occurrence.

The results of the site investigations to date are summarized in three sections; 1) Mutton Creek, 2) Site Use, and 3) Ground Water.

Mutton Creek

Mutton Creek receives contaminants from the landfill by one or more of the following pathways: surface water runoff and erosion of contaminated soils, leachate seeps that discharge into the creek, and ground water migration through the landfill recharging the creek. Since ground water decisions are



NOTES:

1. WS 001, 002, AND 401 ARE LANDFILL LEACHATE SAMPLES. THE REMAINING SAMPLES ARE SURFACE WATER (CREEK OR POND).
2. SEE TABLE 3-2 FOR TYPES AND CONCENTRATIONS OF CONTAMINANTS FOR EACH LOCATION.

FIGURE 3
SAMPLING / CONTAMINATION LOCATIONS SURFACE WATER PHASE I DATA

Table 1: Applicable Criteria

Sample Location	Parameter	Concentration[a]	Freshwater Aquatic Life[d] 1980 24 hr.	1980 Anytime	1985 4 day avg. Once in 3 yr	1985 one hour avg Once in 3 yr	Ingestion (10^{-6}) Water & Aquatic Organisms	Water Only	Aquatic Organisms Only
WS002	Cadmium	1.1	.09	10.31	2.84	14.67	10.0		
	Chromium	30.0	.29	21.0	11.00	16.00	50.0		
	Cyanide	43.0	3.5	52.0	5.2	22.0			
	Lead	47.0	59.8	716.9	14.1	363.0			
	Nickel	220.0	232.4	4485.7			13.4	15.4	100.0
	Zinc	271.0	47.0	848.0					
WS001	Lead	27.0	59.8	716.9	14.1	363.0			
	Nickel	204.0	232.4	4485.7			13.4	15.4	100.0
	Zinc	326.0	47.0	848.0					
	2-Butanone								
WS401	Nickel	60.0	232.4	4485.7			13.4	15.4	100.0
	Zinc	799.0	47.0	848.0					
	Silver	49.0	.12[b]	30.3			50.0		
	1,2-Dichloropropane	190.0	5700.0[b]					.56	
	Toluene	330.0		17500.0[c]			14300.0		424000.0
	4-Nitrophenol	90.0		230.0[c]					
	P-Chloro-m-cresol	20.0		30.0[c]					
	Di-N-Butyphthalate	26.0							
	4-Methylphenol	9.8							
	2 Hexanone	380.0							
	4-Methyl-2-pentanone	490.0							
	2-Butanone	22000.0							
	Trans-1,2-Dichloroethene	710.0							
	1,1-Dichloroethane	63.0							
SS401	4 methyl-2 pentanone	20.0							
	Toluene	33.0							
	Xylene	5.0							
	Chloromethane	13.0							
	Acetone	922.0							
	2-Butanone	304.0							
	gamma BHC	9.0							

Notes: a. water samples (WS) in ug/l; sediments samples (SS) in ug/kg.
b. available data indicate chronic toxicity may occur at concentrations as low as this value.
c. available data indicate acute toxicity may occur at concentrations as low as this value.

being deferred, this section addresses only the potential for contamination of the creek via erosion of contaminated soils and leachate seeps. Contamination of Mutton Creek is a concern because it flows into Island Lake, a recreational lake (fishing, swimming) located approximately 3.5 miles to the west. The source of Mutton Creek, Mud Lake (also known as Lake Bredeen), is located approximately 1/4 mile northeast of the landfill. The area around the creek is rural and agricultural. The creek varies in width and depth as it passes north of the landfill site. The width varies from one to three feet, and it is a perennial stream. The creek is large enough to sustain invertebrate forms of aquatic life, but is probably too small to support fish life.

Test results from surface water and sediment samples taken on and around the landfill during the RI have documented a release of contaminants from the landfill to the creek. Sampling locations are shown on Figure 3. Leachate seeps discharging to Mutton Creek are identified as WS401 and WS002. The other leachate seep WS001, is on the southwest side of the landfill. The corresponding sediment samples are denoted with an "SS" before the sample location number. Table 1 shows the concentrations of contaminants in leachate samples and indicates which concentrations exceed the cancer risk, health or fresh water aquatic life criteria. New water quality criteria have recently become available for some metals, and have been incorporated in the table.

Table 1 shows that the discharges exceed fresh water aquatic life criteria levels for the metals: cadmium, zinc, lead, silver and chromium. Cyanide exceeds freshwater aquatic life criteria and the State of Illinois standards for general use. In addition, five metals are found in higher concentrations at downstream sampling location WS301 than upstream location WS101 (Barium, iron, nickel, zinc, and lead). All other compounds (principally the organics) detected do not have criteria to which to compare these leachate discharge concentrations or were below criteria levels.

No pesticides were detected upstream (BHC, however, was found in leachate sediment SS401). Pesticides were found in the creek downgradient of the site at WS301. Pesticides have also been found in the monitoring wells on both sides of the creek. The presence of pesticides in the creek may be due to both the landfill and the agricultural practices in the area. Since this is an agricultural community it is impossible to separate the contributions of pesticides made to the creek by the landfill versus the adjacent agricultural field. Consequently, the pesticide data has been deleted from table.

The leachate stream sediment sample SS401 contains seven organic contaminants. The downstream sediment sample SS301 has three of the same contaminants as SS401 (Toluene, Acetone, 2-Butanone). The landfill is the likely source of these contaminants.

Site Use

The landfill has experienced some subsidence. This has created depressions where ponding occurs, thus increasing infiltration. Unvegetated areas are eroding, which may result in exposure of landfill materials and leachate seepage. Some waste materials (tires, etc.) are protruding from the surface. Leachate seeps along the north perimeter of the landfill area discharge to Mutton Creek. Leachate

seeps along the southern end of the landfill do not discharge to any body of water, but may be a direct contact threat. This site is readily accessible and is used as a recreational area. The southern 18 acres are used for model airplane flying and rifle practice. In the winter, the entire surface is used for snow-mobiling.

Ground water

Ground water flows through this site from the south to the north and northeast in the shallow aquifer (Figure 4). The toxic compounds of principal interest (i.e. detected in ground water above applicable criteria) in the ground water are nickel, lead, chromium, cadmium, vinyl chloride, benzene, trichlorethene, N-nitrosodiphenylamine, bis (2 choroethyl) ether and tetrachlorethene. The pesticides heptachlor, dieldrin and BHC have also been detected above relevant criteria, however, their presence may also be due to nearby land use. Arsenic was detected at levels exceeding the 10^{-6} cancer risk criteria but below drinking water criteria. PCBs detected during the initial site investigation were not detected during the RI. Other contaminants have been detected but are below relevant criteria or have no established criteria.

During Phase I of the remedial investigation 21 residential homes and 25 monitoring wells were sampled. Three residential wells were found to contain at least one organic contaminant above the 10^{-6} cancer criteria, or inorganic contaminant above health criteria. A total of 13 out of 25 monitoring wells contained at least one organic contaminant above the 10^{-6} cancer criteria. Numerous inorganic contaminants were also detected.

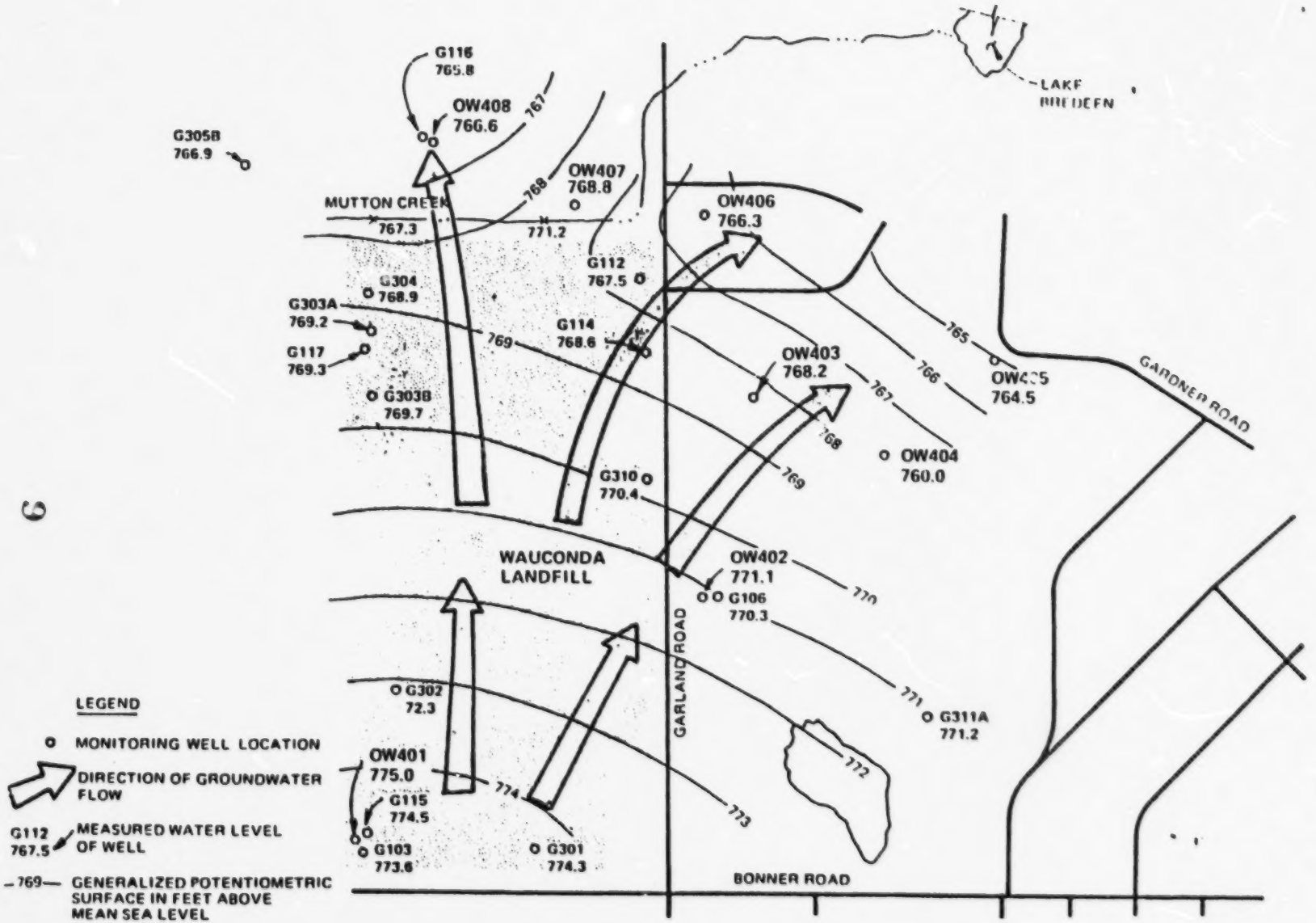
The Phase II sampling effort was undertaken to address a concern, articulated by WTG, that collection of unfiltered samples during Phase I resulted in an overestimation of metal contamination. Therefore, fifteen wells were resampled for filtered and unfiltered metals analysis. Samples were split with the WTG. The Phase III effort consisted of constructing eight new wells (by WTG). During this phase of investigation, all eight new wells were sampled, and six existing wells were resampled. The ground-water data from all phases are summarized on Table 2. All RI sampling efforts are summarized on Table 3.

Summary of Ground water Data

A review of existing data shows a release of some contaminants to the ground water. However, the low levels of contaminants and limited amount of data make drawing conclusions about the ground water and areal extent of the release impossible at this time. Due to the low levels of contaminants a statistical approach to data evaluation is recommended. However, application of these methods requires more data points than exist at present. Therefore, additional ground water sampling and investigations are being included in the additional RI/FS tasks.

Enforcement Analysis

See Attachment A.



NOTE:
DIRECTION OF GROUNDWATER FLOW DEVELOPED FROM PHASE III RI WATER LEVEL MEASUREMENTS.

FIGURE 4
GROUNDWATER FLOW DIRECTION IN UPPER AQUIFER

Table 2
SAMPLED WELLS INDICATING PRIORITY POLLUTANTS
AT OR ABOVE USEPA CANCER RISK OR HEALTH CRITERIA
PHASE I, PHASE II, OR PHASE III

Sample ID	Contaminant Name	Reported Concentration (ug/L) Phase I Unfiltered	Phase II Unfiltered/ Filtered	Phase III- Unfiltered/ Filtered	Criteria (ug/L)
G102	Arsenic	186	27/15	NS	50[c](2.5 ng/L)[a]
	Chromium	207	5.3/bdl		50[c]
	Lead	4,000	1,490[i]/bdl		50[c]
	Nickel	436	bdl/bdl		15.4[b]
	Tetrachlorethene	21			.88[a]
G103	Lead	98	23i/bdl	68/bdl	50[c]
	Chromium	21	65/5.3	62/bdl	50[c]
	Nickel	bdl	bdl/bdl	38/6	15.4[b]
	Arsenic	16	bdl/bdl	30/bdl	50[c](2.5 ng/L)[a]
	N-Nitrosodiphenylamine	47	NA	bdl	4.9[a]
	Trichlorethene	51	NA	bdl	2.8[a]
G104	Cadmium	14	bdl/bdl	NS	10[c]
	Chromium	87	73/3.9		50[c]
	Lead	225	bdl/9.8[i]		50[c]
	Nickel	364	123/bdl		15.4[b]
G105	Chromium	51	21/bdl	NS	50[c]
	Lead	126	36[l]/bdl		50[c]
	Nickel	131	21/bdl		15.4[b]
G106	Tetrachlorethene	18	NS	NS	.88[a]
G112	Chromium	53	37/6.3	NS	50[c]
	Lead	86	7.3[l]/bdl		50[c]
	Nickel	117	19/11		15.4[b]
	Tetrachlorethene	14			.88[a]
G112D	Lead	--	12.5[i]/NS	--	50[c]
	Nickel	--	31/NS	--	15.4[b]
G113	Arsenic	78	NS	NS	50[c](2.5 ng/L)[a]
	Tetrachlorethene	6			.88[a]
	Benzene	9			.67[a]
G114	Lead	55	bdl/bdl	40/bdl	50[c]
	Nickel	85	34/32	65/32	15.4[b]
	Arsenic	44	26/23	40/25	50[c](2.5 ng/L)[a]
	Chromium	42	9.2/4.0	49/bdl	50[c]
	Dieldrin	0.006			0.0011 ng/L[a]
	Heptachlor	0.10			0.0112[a]
	Vinyl Chloride	27			2.0[a]
	N-Nitrosodiphenylamine	g			4.9[a]
	Benzene		4[e]		0.67[a]

Table 2
(continued)
SAMPLED WELLS INDICATING PRIORITY POLLUTANTS
AT OR ABOVE USEPA CANCER RISK OR HEALTH CRITERIA
PHASE I, PHASE II, OR PHASE III

Sample ID	Contaminant Name	Reported Concentration (ug/L) Phase I Unfiltered	Phase II Unfiltered/ Filtered	Phase III Unfiltered/ Filtered	Criteria (ug/L)
G114D	Lead	68	--	--	50[c]
	Nickel	104	--	--	15.4[b]
	Arsenic	52	--	--	50[c](2.5 ng/L)[a]
	Chromium	49	--	--	50[c]
	Vinyl Chloride	30	--	--	2.0[a]
	N-Nitrosodiphenylamine	10	--	--	4.9[a]
	Tetrachlorethene	7			.88[a]
G115	Lead	50	NS	43/bdl	50[c]
	Nickel	bdl		35/9	15.4[b]
	Arsenic	bdl		24/bdl	50[c](2.5 ng/L)[a]
	Heptachlor	0.012		bdl	0.0112[a]
	N-Nitrosodiphenylamine	52		bdl	4.9[a]
G116	Nickel	42	NS	42/33	15.4[b]
G117	Nickel	43	bdl/bdl	NS	15.4[b]
	Tetrachlorethene	8			.88[a]
203A	Lead	153	72[i]/bdl	68/bdl	50[c]
	Nickel	20.7	bdl/bdl	43/23	15.4[b]
	Bis(2-chlorethyl)ether	5.6	NA		0.03[a]
	Benzene	4.6	NA		0.67[a]
203AD	Lead	bdl	--	50/35	50[c]
	Nickel	bdl	--	25/23	15.4[b]
	Bis (2-chlorethyl) ether	5.7	--	bdl	0.03[a]
	Benzene	4.4	--	11[j]	0.67[a]
G250	Vinyl Chloride	3.8	NS	NS	2.0[a]
G301	Nickel	45	bld/bdl	NS	15.4[b]
	Vinyl Chloride	bdl	5[e]		2.0[a]
	Tetrachlorethene	26			.88[a]
G301D	Vinyl Chloride	--	4.5[e]	--	2.0[a]
	Trichlorethene	--	2.5[e]	--	2.8[a]
303A	Nickel	47	NS	38/20	15.4[b]
	Lead	bdl		88/7	50[c]
	N-Nitrosodiphenylamine	14		bdl	4.9[a]
	Benzene	bdl		16[j]	0.67[a]
	Gamma-BHC (Lindane)	0.0025			0.018[a]

Table 2
(continued)
SAMPLED WELLS INDICATING PRIORITY POLLUTANTS
AT OR ABOVE USEPA CANCER RISK OR HEALTH CRITERIA
PHASE I, PHASE II, OR PHASE III

Sample ID	Contaminant Name	Reported Concentration (ug/L) Phase I Unfiltered	Phase II Unfiltered/ Filtered	Phase III Unfiltered/ Filtered	Criteria (ug/L)
303B	Chromium	125	190/bdl	NS	50[c]
	Lead	219	182.5[i]bdl		50[c]
	Nickel	149	162/bdl		15.4[b]
G304	Arsenic	87	142/14	NS	50(2.5 ng/L)[ad]
	Lead	69	118.5[i]/bdl		50[c]
	Nickel	102	192/19		15.4[b]
	Chromium	bdl	44/bdl		50[c]
	Benzene	6	NA		0.67[a]
	Tetrachlorethene	10			.88[a]
G306	Lead	52	bdl/bdl	NS	50[c]
	Tetrachlorethene	10			.88[a]
G307	Lead	52	17[i]/bdl	NS	50[c]
	Nickel	49	53/bdl		15.4[b]
	Benzene	7	NA		0.67[a]
G308	Nickel	63	bdl/bdl	NS	15.4[b]
	Arsenic	34	31/28		50[c](2.5 ng/L)[a]
G308D	Arsenic	--	32/bdl	--	50[c](2.5 ng/L)[a]
G310	Lead	109	bdl/bdl	NS	50[c]
	Chromium	63	bdl/bdl		50[c]
	Nickel	103	bdl/bdl		15.4[b]
	Vinyl Chloride		4.5[e]		2.0[a]
G310D	Lead	105	--	--	50[c]
	Chromium	62	--	--	50[c]
	Nickel	110	--	--	15.4[b]
G309	Trichlorethene	6	NS	NS	2.8[a]
	Chromium	85			50[c]
	Alpha-BHC	.01			.0092
G311A	Benzene	22	NS	NS	0.67[a]
	Trichlorethene	28			2.8[a]
	Tetrachlorethene	17			.88[a]
OW401	Benzene	--	--	11[j]	0.67[a]
OW402	Nickel	--	--	48/32	15.4[b]
	Arsenic	--	--	9/bdl	50[c](2.5 ng/L)[a]
	Benzene	--	--	4[j]	0.67[a]

Table 2
(continued)
SAMPLED WELLS INDICATING PRIORITY POLLUTANTS
AT OR ABOVE USEPA CANCER RISK OR HEALTH CRITERIA
PHASE I, PHASE II, OR PHASE III

Sample ID	Contaminant Name	Reported Concentration (ug/L) Phase I Unfiltered	Phase II Unfiltered/ Filtered	Phase III Unfiltered/ Filtered	Criteria (ug/L)
OW403	Vinyl Chloride	--	--	1.9[f]	2.0[a]
OW404	Nickel	--	--	38/6	15.4[b]
	Arsenic	--	--	23/bdl	50[c](2.6 ng/L)[a]
OW406	Nickel	--	--	30/10	15.4[b]
	Arsenic			13/bdl	50[c](2.5 ng/L)[a]
OW406D	Nickel	--	--	30/14	15.4[b]
	Arsenic	--	--	11/bdl	50[c](2.6 ng/L)[a]
OW407	Nickel	--	--	18/8	15.4[b]
	Vinyl Chloride	--	--	2.0[f]	2.0[a]
OW408	Nickel	--	--	30/28	15.4[b]

[a]USEPA assigned carcinogen risk level of 10^{-6}; one additional case of cancer in a population of 1,000,000 exposed for a lifetime.

[b]USEPA health criteria (noncarcinogen; no adverse health effect level).

[c]USEPA primary drinking water standard.

[d]Arsenic carcinogenicity is currently being re-evaluated by USEPA; therefore both drinking water standard and cancer risk criteria are shown.

[e]Estimated value.

[f]Presence indicated but less than detection limit.

[g]Detectable, but low quantifiable levels.

[h]High laboratory data fluctuations for arsenic, results could be high- or low-biased.

[i]Laboratory matrix spike measurements show low recoveries for lead (70 percent); thus, the data are low-biased.

[j]Benzene detected in field sample blanks and laboratory blanks; thus, this could be an additive contaminant.

Notes: D = duplicate sample.
bdl = below detection limit.
NA = not analyzed; only three wells tested for organics during Phase II (G114, G301, and G310).
NS = not sampled.

Criteria Source: Ambient Water Quality Criteria for Water. USEPA. 1980

Table 3

Sampling Phases

Monitoring Well	Remedial Investigation 1983	Supplemental Investigation, 1985	
	Phase I	Phase II	Phase III
G102	X	X	
G103	X	X	X
G104	X	X	
G105	X	X	
G106	X		
G112	X	X	
G113	X		
G114	X	X[1]	X
G115	X		X
G116	X		X
G117	X	X	
G301	X	X[1]	
G302	X		
G303A	X		X
G303B	X	X	
G304	X	X	
G305A	X		
G305B	X		
G306	X	X	
G307	X	X	
G308	X	X	
G309	X		
G310	X	X[1]	
G311A	X		
G311B	X		
OW401			X
OW402			X
OW403			X
OW404			X
OW405			X
OW406			X
OW407			X
OW408			X
			X
Residential Wells[2]			
G201	X		
G203A	X	X[1]	X
G250	X		

1. These are the only three wells which had organic and inorganic analysis in Phase II; all others sampled in Phase II had analysis for metals only.

2. 21 residential homes were sampled; only those listed here identified some type of contaminant.

Alternative Evaluation -- Summary of Feasibility Study

The Feasibility Study proposed several source control and containment alternatives. These alternatives were screened and a preliminary selection of the most feasible alternatives were submitted for public review and comment in the Remedial Investigation Analysis/Development of Alternatives Report (November 1, 1984). This report identified the following site problems:

- contaminated materials within the landfill
- high ground water in contact with contaminated material
- contaminated shallow aquifer ground water migrating north and east from the landfill
- precipitation infiltrating through the existing soil cover of the landfill to form leachate
- leachate discharging from the landfill to Mutton Creek

This operable unit addresses only the last problem listed above: leachate discharge to Mutton Creek. Because the FS discusses all other problems at the site, a review of each of the seven alternatives discussed is briefly presented here. Since the groundwater remedy is being deferred, Alternatives 2, 3, 4, and 5 are still under review and consideration for future action. The operable unit recommended at the present time is addressed by Alternatives 1, 6, and 7.

A list of potential technologies for controlling surface and ground water contaminant migration at Wauconda was developed by geotechnical and industrial waste process engineers and a hydrogeologist. The following is a list of technologies reviewed and the screening criteria:

Technologies Reviewed

- Excavation
- Emission control
- Solids/semi solids treatment
- Liquids treatment
- Insitu treatment
- Solids disposal (untreated wastes)
- Capping
- Vertical containment barriers
- Horizontal containment barriers
- Ground water pumping
- Subsurface drains
- Liquids disposal (untreated wastes)
- Gas collection systems
- Recovery/reuse/recycling
- Alternative water supply

Screening Criteria

- Applicability
- Status of technology
- Implementability
- Reliability
- Operation and maintenance
- Cost requirements

Based on this screening process, the feasibility study thoroughly investigated 7 alternatives. Table 4 is a cost summary for these alternatives. This feasibility study was submitted for public review and comment on August 12, 1985. The remainder of this section describes the alternatives evaluated in the Feasibility Study based on existing data.

Alternative # 1: New Cap

This Alternative would eliminate leachate discharge to Mutton Creek and reduce ground water contaminant migration by minimizing infiltration of water through the waste due to precipitation. The cost and effectiveness of a 2-foot thick clay cap was compared to a 30-mil-thick PVC plastic liner. The plastic liner was selected as the most reliable, effective means of reducing the present infiltration estimated to be 3.5 million gallons per year by 98 to 100 percent. However, this alternative alone does not address the estimated 5.3 million gallons of ground water that is estimated to flow horizontally through the landfill annually. The present worth of this alternative is estimated to be 10.4 million dollars.

Alternative # 2: New Cap and Vertical Barrier (Slurry Wall)

This alternative would reduce ground water contaminant migration and surface leachate discharge by minimizing infiltration due to precipitation and reducing ground water flow through the site. The PVC liner cap as described in Alternative 1 is included in this alternative. In addition, an impervious vertical barrier in the ground around the site called a slurry wall would be constructed. The slurry wall should divert ground water around the landfill. The present worth of Alternative 2 is estimated to be 18.7 million dollars.

Alternative # 3: New Cap, Ground water Pumping, and Liquids Treatment

This Alternative would reduce surface leachate discharge and ground water contaminant migration by minimizing infiltration due to precipitation and redirecting contaminated ground water flow to a pump out system. The PVC liner cap as described in Alternative 1 is included in this alternative. Although the cap would not prevent ground water from flowing through the landfill and leaching contaminants from wastes buried beneath the groundwater table, the pumping of ground water around the site directs the groundwater flow direction toward the pump out wells. As a result, a hydraulic barrier is created. The alternative includes pumping of off-site ground water in areas where contaminants have been identified. Because the on-site contaminant removal times are so slow, the pumping wells would probably have to be operated indefinitely in order to prevent future release of contaminants. The present worth of this alternative is 21.6 million dollars based upon treatment for metals removal on site with effluent discharge to Wauconda Sewage Treatment Plant for COD removal.

Alternative # 4: New Cap, Vertical Barriers, Ground water Pumping, and Liquids Treatment

Alternative 4 combines Alternatives 1, 2, and 3. These alternatives have been previously described. The present worth of this alternative is 28.2 million dollars.

Table 4

Cost Summary (million dollars)

Alternative	Capital Cost	Annual O & M	Present Worth[a]
1. New Cap	9.4	0.10	10.4
2. New Cap and Barrier Wall	17.7	0.10	18.7
3. New Cap, Groundwater Pumping, and Liquids Treatment	13.7	0.83	21.6
4. New Cap, Barrier Wall, Groundwater Pumping, and Liquids Treatment	22.0	0.65	28.2
5. Groundwater Pumping and Liquid Treatment	4.3	0.83	12.2
6. No Action	0.0	0.0	0.0
7. Cap Repairs and Fence	1.6	0.05	2.1

a. Present worth is estimated over a 30 year period.

Alternative # 5: Ground water Pumping and Liquids Treatment

This alternative is the same as Alternative 3 except that the new cap would not be included. The present worth of this alternative is 12.2 million dollars.

Alternative # 6: No Action

The no action alternative would leave the site as it is; i.e., no action would be taken to reduce infiltration or migration of leachate and contaminated ground water off-site. No action with respect to the leachate discharge to Mutton Creek is unacceptable because there is a documented release of hazardous constituents to the creek via leachate streams. While the effect of leachate discharges to Mutton Creek cannot be fully evaluated at present, the discharge of leachate at levels in excess of freshwater aquatic life criteria may have an adverse effect on Mutton Creek and Island Lake in the future. Human exposure to the leachate is limited to direct contact threat for which there is no standard or method to assess health effects. Potential contact at the site also results from exposure to the existing gas vents.

Alternative #7: Cap Repair and Security Fence

This alternative would eliminate discharge of contaminated leachate to Mutton Creek and erosion of contaminated soils. The cap repair also eliminates exposure of landfill materials in settled and eroded areas. Proper sloping and grading reduces ponding and promotes rain run off. The cap repairs include draining leachate seeps, filling in settled and eroded areas, regrading the surface. The fence insures safety to the public and protects the cap repair actions.

This alternative is a preparatory task required for implementation of any of the above alternatives. This is not a stand alone alternative, but must be used in conjunction with a final determination of ground water releases. This alternative meets the CERCLA goals of minimizing present hazards and protecting public health and the environment. The present worth of this alternative is 2.1 million dollars.

Summary of alternatives evaluated

Alternatives 2, 3, 4, and 5 include remedial technologies to address ground water contamination. Since groundwater remedies have been deferred, further evaluation of alternatives 2, 3, 4, and 5, is not needed. Alternatives 1 and 7 address only surface discharges.

Alternatives 1 and 7 meet the stated objective of eliminating discharge of leachate to surface water. The plastic liner in Alternative 1 reduces infiltration to nearly zero. However, this alternative is costly and may not be consistent with the final remedy. Implementation of Alternative 7 is a necessary component of any foreseeable remedial activity undertaken to address groundwater contamination. It represents the least extensive remedial activity consistent with the objective of eliminating contaminated leachate discharge and is considered basic maintenance for closed landfills. Alternative 7 is therefore considered a cost effective interim measure which will be consistent with the final remedy.

Recommended Alternative

It is recommended that Alternative 7 be implemented as an interim remedial measure. Alternative 7 includes:

- Installing leachate collection drains (ie: ground blanket and/or buried, perforated pipe drains) in seep areas to stop surface leachate discharge into Mutton Creek.
- Providing for proper disposal of leachate; either at the Wauconda Sewage Treatment Plant, or a hazardous waste treatment facility in accordance with Agency policy.
- Regrading settled, depressed and eroded areas on the existing landfill soil cover with sufficient slope to promote rain runoff. This will eliminate ponding and reduce infiltration.
- Revegetating bare and eroded areas to prevent erosion of soils into Mutton Creek.
- Constructing a fence around the site to prevent human contact with gas vents and leachate collection system.

Community Relations

There are approximately 12 residents living within a quarter mile of the Wauconda Sand and Gravel site. Their participation in the RI/FS process has been limited to attending the RI data review meeting and FS meeting. The village of Wauconda officials have followed the study, but have not actively participated in, nor commented on any aspect. This community has not organized in any fashion to oversee the investigation. In fact, they have relied on the Agency's study approach and have appreciated periodic project updates. This is evident from the brief responsiveness summary attached.

Consistency with Other Environmental Laws

Since the Agency is deferring selection of a ground water remedy for this site, no further discussion concerning consistency with other laws is needed. Alternative 1, new cap, has been eliminated from further review since it may not be consistent with the final remedy. The operable unit, Alternative 7, cap repair, will be reviewed. Two environmental laws are potentially involved under this alternative. First, under RCRA policies, cap repair will not meet the RCRA closure requirements, as a stand alone action. Secondly, the Executive Order on Wetlands and Floodplains is involved due to Mutton Creek. The northern portion of the landfill slopes as it meets Mutton Creek. Part of this slope area is within the 100 year flood elevation level. However, cap repairs will occur above this level. A review of these issues are presented below.

Resource Conservation and Recovery Act (RCRA)

Under the proposed National Contingency Plan (February 12, 1985), Section 300.68 and in the Administrator's memorandum entitled "CERCLA Compliance With Other Environmental Stautues," compliance with other statues for interim response measures is not necessary. Although Alternative 7 does not comply with RCRA, the Agency considers it an interim remedy, and a necessary first step prior to implementing any of the other alternatives.

Flood Plain Assessment

The northern portion of the landfill is bordered by Mutton Creek. There is a 100 year flood elevation level, which on the southern side (bordering the landfill) is estimated at between 775 and 780 feet (mean sea level) according to the survey conducted for this site investigation (Figure 5). The current creek elevation is at 766.3 feet. The Illinois State Water Survey has been asked to confirm the Agency's estimate for flood elevation. Their letter of concurrence is contained in Appendix C.

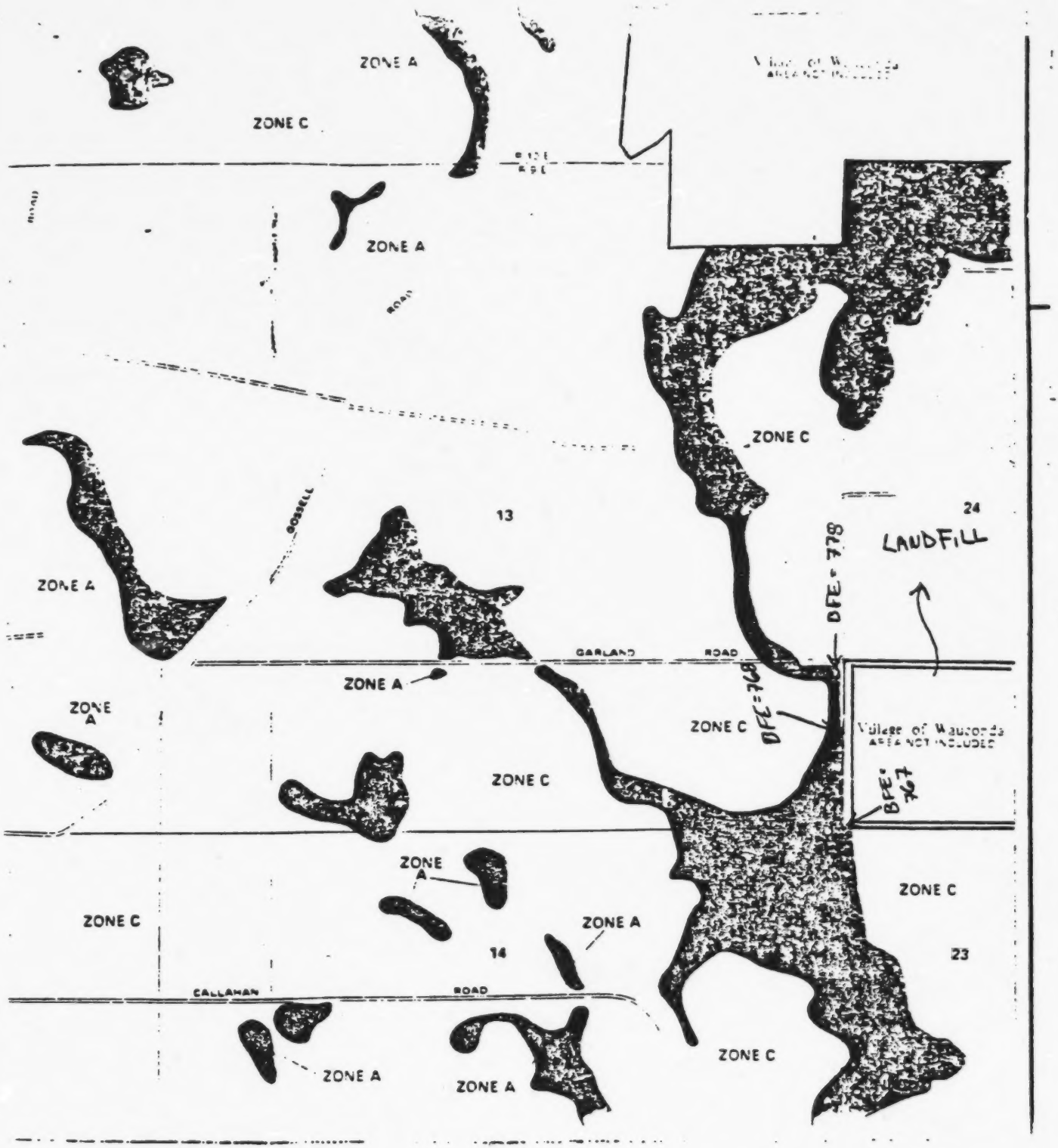
All cap repair actions will occur above the estimated 100 year flood plain elevation. In addition, a border (e.g.; rip-rap) will be considered (during the design phase) for placement adjacent to Mutton Creek for long-term protection of the cap repair action against excessive erosion due to storm events.

Operation and Maintenance

O&M costs are anticipated for 30 years for this operable unit. These costs are estimated at $50,000 annually. This includes periodic inspection, maintenance and repair of the cap to insure its integrity, and leachate disposal costs. The leachate would need to be tested prior to disposal to determine a suitable disposal location. This surface leachate flow has not been throughly quantified but is estimated to generate approximately 1500 gallons per month of waste. Based on the levels of biodegradable organics and metals present in the seeps, it is likely that BOD, COD, and total suspended solids will be the major waste characterization parameters. It is recognized that chemical leachate characteristics will be variable. If, based on waste characterization or Agency policy, the Wauconda Sewage Treatment Plant can not accept the waste, a local hazardous waste treatment facility will be used. These disposal costs would vary between 15 cents and 2 dollars per gallon. For cost estimating purposes, the higher figure has been used.

Schedule (subject to change pending availability of funds upon reauthorization of CERCLA)

- Aproved operable unit	09/30/85
- Amend IAG for USACE selection of A/E	09/30/85
- Cooperative Agreement State of Illinois for oversight of federal lead design	12/31/85
- Corp. selects A/E	12/31/85
- Amend IAG for USACE Design	12/31/85
- Start Design	01/01/86
- Complete Design	06/30/86
- Amend IAG for USACE Construction	06/30/86


ZONE A
ZONE C
ZONE A
ZONE C
13
24
LANDFILL
ZONE A
ROSSELL
GARLAND ROAD
BFE=778
DFE=778
ZONE A
ZONE C
ZONE A
Village of Wauconda
AREA NOT INCLUDED
BFE=
ZONE C
ZONE A
ZONE C
ZONE C
14
ZONE A
23
CALLAHAN ROAD
ZONE A
ZONE A
ZONE C

- Amend Cooperative Agreement State of Illinois for Construction	06/30/86
- Start Construction	07/01/86
- End Construction	10/30/86

Future Actions

Concurrent with the remedial actions being recommended now, additional RI/FS work will be required at the Wauconda Sand & Gravel site. The major objectives are to better define water quality in the upper aquifer and to better quantify current and potential endangerment to any receptor. The current data base must be supplemented in order to answer those objectives. Additional RI/FS work will include:

1) Determine the depth of 14 residential wells within 1/4 mile north and east of site in direction of groundwater flow. Also inspect the well for integrity and potential for acting as a conduit between the upper and lower aquifers.

2) Determine the limits of the upper aquifer, and confining layer north and east of the site. This will likely require additional soil borings or monitoring wells.

3) Determine the migration potential of identified compounds. This will include additional sampling for a statistically significant database.

4) Locate offsite background wells to determine ambient background ground water quality.

Based on additional data, alternatives for the final remedial actions will be reevaluated, and additional alternatives reviewed if necessary.

Appendix B: Community Relations Responsiveness Summary

Community Relations Responsiveness Summary

Wauconda Sand and Gravel Landfill

Wauconda, Illinois

Introduction

This community relations responsiveness summary documents citizens' concerns, and issues addressed to U.S. EPA during the execution of RI/FS activities at the Wauconda Sand and Gravel site. It also documents, for the public record, the U.S. Environmental Protection Agency's (USEPA) response to the comments presented during the public comment period for this operable unit.

Concerns Raised Prior to the Feasibility Study Comment Period

Concern: During the initial remedial investigation, three residential wells were found to be contaminated. This was brought out in the public meeting held after the first phase of field investigations (September 27, 1984). The 12 residents living within one quarter mile of the site were concerned about the quality of their drinking water. In response to that concern, the Agency resampled all the homes again. No contaminants were found, and the residents were notified of these results.

Concern: The Potentially Responsible Parties (PRPs) formed a task group after RI results were released. They hired a technical consultant to review the Agency contractor's work. In response to their concerns that the amount of contamination caused by the landfill was overestimated, two additional phases of sampling were completed. The Record of Decision presents the results of these additional investigations. Other comments raised by the PRPs are listed below.

Concerns Raised During the Comment Period

Copies of the Feasibility Study were made available to the public on August 12, 1985. A public meeting was held on August 14, 1985, to present the actions proposed in the operable unit. Approximately 25 people attended the meeting. Although the attendees had several questions, comments were not submitted at the meeting. A summary of the questions and answers from the meeting is attached. The comment period closed on August 30, 1985.

The Agency subsequently received written comments from two parties. One letter was received from a resident living across the street from the site. The other comments were submitted by the PRPs. These comments are addressed below.

Comments and Responses

1. Tom and Jane Brown

Comment: They were hoping for more definitive actions at the site, but accept EPA's need for additional data (see attached letter).

Response: The Brown's letter seemed to reflect the views of the community. They feel that some limited action is a positive step; further, they understand why additional investigation is necessary before a final remedy can be selected.

2. Wauconda Task Group / Connestoga-Rovers and Associates (PRPs)

The WTG/CRA submitted a 21 page report which they feel supports their 8 comments on the RI/FS activities to date. In this summary, their comments are paraphrased to shorten the text, however, a copy of the specific comments are attached.

Comment 1: "The conditions at the Wauconda Landfill are typical of sanitary landfills throughout the country."

Response: CERCLA authorizes the Agency to take appropriate action, inter alia, where there has been a release of hazardous substances. Accordingly, the Agency is authorized to respond to the situation at the site. WTG/CRA's comment, therefore, must be interpreted as a statement that the situation at the site does not present an unusual or serious situation. Based upon the data in the RI report and supplemental RI report, the Agency does not agree with that comment.

Comment 2: "The data collected to date does not support the conclusion that a hazardous 'contaminant plume' is emanating from the Wauconda site."

Response: The landfill contains a very large volume of waste materials. Waste types, quantities, and waste burial locations within the landfill are unknown. The glacial geology and hydrologic conditions at the site are varied and unpredictable. Given these conditions, ground water inconsistencies between widely-spaced monitoring wells in the off-site locations is not unexpected. Hence, no attempt was made to map the limits of a plume for each compound detected. This does not negate the fact that chemical constituents are migrating with the ground water flow. Low levels of priority pollutants and other tentatively identified compounds are identified in on-site and off-site wells. A leachate plume is migrating off-site. This release is vaguely characterized by low levels of priority pollutants, of which, only a few exceed the 10^{-6} cancer risk level. The Agency recognizes that the inorganic and organic releases from the landfill need further quantification. Thus, the Agency has postponed all decisions relative to groundwater remedial actions at the site.

Comment 3: "Based on existing data, landfilled waste appears not to be buried in the upper aquifer"

Item 1: Groundwater in the upper aquifer flows through the landfill.
Item 3: The bottom of the landfill is at 730 ft. AMSL.
Item 4: The volume of waste (5.4 million yds^3) is based on assumed bottom elevation of 730 ft. AMSL.

Response: These comments are combined since they address the same issue.

CRA contends that waste materials are located above elevation 776 feet, and that a silty clay layer separates the waste materials from the underlying sand and gravel aquifer. CRA supports their position with the following: a) a statement by the landfill owner, b) information from the landfill vents, c) the presence of mounded leachate, and d) the absence of dewatering records.

Data supporting the Agency's position that waste materials are buried within the shallow aquifer are: a) an ISGS report dated April 13, 1970, which states that waste materials extend approximately 40 feet into the aquifer, b) the boring log for monitoring well G307 which indicates that waste materials extend to elevation 657 feet, or lower. Well G307 was drilled at the northern end of the landfill and may be in the side slope of the original pit rather than the bottom of the pit, and c) electrical earth resistivity data reported by D'Appolonia and Associates in the RI Data Report.

Regarding CRA's landfill vent information, it would be important to know the following: a) how and when the vents were installed, b) what measures were taken to log the materials that were encountered in the boreholes used to install the vents, c) which documents state that the bottom of the vent pipes corresponds with the bottom of the landfill; and d) whether or not there is any heave material or debris in the lower portion of the vent pipes.

Regarding the leachate mounding issue, it is not possible to credit CRA's contention absent additional information on the vents, and whether water levels measured in the vents are representative of leachate levels within the landfill. Furthermore, the presence or absence of a "leachate mound" within the landfill has no direct bearing on how deep waste materials are buried.

Because of the leachate mound, CRA concludes that the bottom of the landfill is lined with silty clay. We believe that, based upon known information, a more plausible explanation for the leachate mound is that the existing soil cover over the landfill is not impervious and allows infiltration. Leachate could also be perched within the landfill over zones of less pervious waste materials.

Evidence that there is no silty clay layer beneath the landfill is contained in a 1974 report by Testing Engineers, Inc. (TEI) entitled "Report of Investigation, Obenauf Disposal Company, Wauconda Landfill." The TEI Report includes the following statements:

> "The soils beneath the refuse consist primarily of granular materials which have limited capabilities for retarding the flow of or attenuating leachate.",
>
> "Some leachate is probably entering the gravel aquifer",
>
> "It is recommended that any refuse placed in the future not be allowed to release detrimental quantities of leachate to the groundwater or surface water systems. This can probably be accomplished by lining future fill areas with clay, such as that found in the northeast corner of the property."

Item 2: Ground water quality which discharges to Mutton Creek is not defined.

Response: Mutton Creek receives contaminants via several pathway; direct discharge of leachate, erosion of sediments containing contaminants and recharge via the groundwater flowing through the site in the northerly direction. Since contaminants have been identified in the groundwater, it is expected that the creek will become a receptor. Hydrologically, Mutton Creek is considered a 'gaining' stream.

Comment 4: "The interpretation of ground water flow direction in the feasibility study is not supported by the data base."

Item 1: Figure 3-5 of the FS shows a water level of 760.0 for OW404; G302 shows a water level of 72.3; the 773 contour line should be drawn south of G302; the 400-Series well locations are located inaccurately on Figure 3-5 and all other figures in the FS.

Response: The water level measurement for OW404 should show 768.0; the water level measurement for G302 should show 772.3. These typographic errors can be corrected. The contour line shown as north of G302 can be drawn south of this well. These are not substantive changes which would effect groundwater flow interpretation.

Item 2: Conductivity measurements (> 1000 mhos) shown in Figure 3-14 are consistent with groundwater flowpaths defined by CRA, and inconsistent with Figure 3-10 of the FS.

Response: Conductivity measurements are not inconsistent with CH_2M Hill ground water flow paths. Conductivity measurements show groundwater flow to be to the north and northeast. Both CH_2M Hill and CRA flow figures show this general direction.

Item 3: The existence of a 'plug' of impervious material in the northeast corner of the site is not supported by boring logs for OW406 and OW407.

Response: Boring OW406 shows clay from the ground surface (elevation 785.2) to 49.6 feet deep (elevation 735.6). Boring OW407 shows clay from the ground surface (elevation 773.0) to 46.5 feet deep (elevation 726.5). Thus there is no inconsistency between these borings and the FS statement that "soil borings confirm that such a plug is present above elevation 740 in this area".

Comment 5: The overall presentation of data in the ground water quality data base is misleading.

Item 1: Table 3.3 states that dieldrin, 4,4-DDD and endrin were detected in groundwater samples from wells OW408, OW403, OW404, OW405 and OW406. These compounds were not found.

Response: The pesticides referred to in Table 3-3 were found by CRA as explained in the last paragraph of FS page 3-21. USEPA detection limits were not low enough to detect the pesticides during phases II and III. CH_2M Hill explained how pesticides were detected in phase I due to lower detection limits, but not in subsequent sampling phases. Since CRA had lower detection limits, the compounds were detected.

Item 2: Turbid and unfiltered samples are presented for assessment in Table 3-1; sample clarity is not reported.

CRA contends that all monitoring well samples for metals analysis should be filtered in the field prior to preservation with nitric acid. CRA also cites two EPA documents (March, 1983, and October, 1983) which support their view.

Response: A more recent USEPA document, "Groundwater Technical Enforcement Guidance Document", (draft) March 21, 1985, includes the following statement:

> "Sometimes metals of concern are bound to sediments in the groundwater. When samples for metals are filtered, these sediments and the bound metals are removed from the sample. In these instances, the samples are not representative of the groundwater quality. Therefore, when owner/operators sample for metals, they must split each of the 4 replicates into two aliquots. One aliquot must be filtered and analyzed for dissolved metals. The other aliquot must not be filtered and it must be analyzed for total recoverable metals."

RI phases II and III included both filtered and unfiltered data for monitoring wells so that comparisons could be made between these data and the clarity of the water that represents "consumable" water quality. However, the data are not sufficient to draw these conclusions.

All data was presented adequately in Table 3-1. Since the release of metals from the landfill has not been quantified, and ground water investigations have not been concluded, there is no reason to eliminate data from summary tables at this time. The FS discusses the manner in which turbid samples can affect data interpretation on page 3-11. Since ground water issues have been deferred for further study, it would be premature to eliminate ground water data from future interpretation at this time.

Item 3: The EPA primary drinking water standard of 50 ug/l should be used as the acceptable level of arsenic in ground water.

Response: In the July 23, 1985 memo by William N. Hedeman, Jr., Office of Emergency and Remedial Response, arsenic is still listed as a carcinogen by ingestion at the 10^{-6} level of 2.5 ng/l. However, this compound is being reevaluated for carcinogenicity. The RI supplement discusses the problems associated with interpretation of arsenic data on page 7-14. The Agency will defer a final decision on this issue until background concentrations of arsenic are established. CRA's report also takes exception to listing TCE as a carcinogen. The Agency's Cancer Assessment Group defines TCE as a carcinogen at the 10^{-6} level of 2.8 ug/l.

Item 4: Wells G102, G105, G305A, G306, G307 and G308 do not monitor ground water quality in the upper aquifer, but monitor water quality within the silty clay formation above the aquifer.

Response: There is no data which shows that these wells are located in a "significantly" less permeable material (referred to by CRA as an aquitard). Existing data on page A-18 of the RI supplement Report shows that well G306 has a lower permeability than other upper aquifer wells by one order of magnitude. Therefore, the Agency concludes that these wells are in a less permeable portion of the upper aquifer.

Items 5,6,8: These items refer to two problems; a) less than detection limit data, b) "representativeness" of the ground water data with respect to Table 3-1 and the associated figures.

Response: The figures (3-8 through 3-10) were based on data presented in Table 3-1. The existing data base is extremely limited and a final groundwater remedy is being deferred. Any editing of the data (for representativeness) presupposes an interpretation (without the presence of the additional data needed to support it), and therefore directs the selection of a final remedy on the groundwater. The FS adequately presents the limitations of the data which should be considered when reviewing Table 3-1.

CRA contends that analytical data that are qualified as "estimated values", "presence indicated, but less than detection limit", and "detectable, but below quantifiable levels" should be excluded from the data base.

Response: The "Groundwater Technical Enforcement Guidance Document" (draft) March, 21, 1985, includes the following statements regarding pollutants that are measured at less than (LT) detection limits:

> "The owner/operator must explain and follow the protocol for determining and reporting low concentration values."
>
> "It is unacceptable to report only qualitative information such as LT for values that were measured below a limit of detection. The enforcement officer must ensure that numerical values accompany the LT designation so that data are available for analysis."
>
> "LT values should not be deleted from the analysis. Instead, LT values should be analyzed at half their reported value."

Elimination of LT values from the data summary table, as was done by CRA in Table 5 of their Phase II Report, and Table 4 of their Phase I Report, gives a false presentation of groundwater quality in the aquifer. To eliminate this problem, lower detection limits must be reached in the future.

Item 7: OW401 should be considered as representing background water quality.

CRA objects to the RI Supplement's dismissal of well OW401 as representative of "background" water quality.

Response: In the course of the RI/FS, several attempts were made to establish representative background well locations. However, in viewing the total data base, it appears that the three wells placed upgradient (but on-site) are still within

the influence of the landfill. In addition, CRA now states that water in the landfill is mounding (thus radial flow is likely). Considering these factors, it is difficult to accept any on-site upgradient monitoring well as representing true background water quality.

Item 9: Presentation of 'Significant Findings' is misleading since it does not consider the representativeness of the data.

Response: The 'significant findings' are single statement summaries regarding all the data to date. These findings put into perspective the types and amounts of contaminants found; filtered data is distinquished from unfiltered data, and the number of wells containing the contaminants are listed. Therefore, the summaries are not misleading.

Item 10: The data assessment makes no attempt to evaluate the impact of the Wauconda landfill on groundwater quality. Concentrations upgradient and cross gradient are not differentiated.

Response: CRA also states that background levels and other sources of contaminants were not investigated. CRA points out that mounding within the landfill is occuring, thus they offer a possible explanation for identifying contaminants within upgradient and cross gradient wells. Further investigation of the ground water is recommended such that the actual releases from the landfill will be distinguished from ambient water quality.

Item 11: EPA should note that wells G104 and G311A are not downgradient of the landfill and therefore contaminants found in these wells should be considered as background water quality.

Response: G104 and G311A are not downgradient according to the groundwater flow paths which have been defined. As pointed out, they may be subject to the landfill's influence, or the influence of other, not yet defined sources.

Item 12: The FS uses pesticides data generated by CRA for pesticide analysis, but excludes remaining data.

Response: The RI supplement and FS were intended to present only the Agency's data. The reference to the pesticide data was made only because CRA had lower detection limits for pesticides than did EPA. Also see response to comment 5, item 1, page 4.

Item 13: CH_2M Hill refers to samples 'split' with CRA, when the word 'duplicate' should be used.

Response: CRA's comment is noted, but is immaterial to the decision being made at this time by the Agency.

Item 14: Further documentation of surface water contamination was not done in supplemental investigations. Based on Table 3-2, only nickel is impacting Mutton Creek.

Response: Supplemental work was conducted to address concerns raised by CRA, it was not intended that the entire RI should be redone. Table 3-2 is not complete since it does not list all contaminants detected in surface water samples which exceed freshwater and aquatic life criteria. This data has been included in the ROD. Barium, iron, nickel, zinc, and lead are found in concentrations higher downstream than upstream. Nickel and iron exceed applicable criteria.

Item 15: The FS discusses contamination of Mutton Creek via erosion of contaminated soils. It also states that levels of inorganics are insignificant, and that that volatile organic contaminants may have originated from Highway 12.

Response: The Contaminated surface soils referred to in the paragraph cited by WTG/CRA refers only to sample SS401 in which seven volatile organic compounds were detected, three of which are also found at low levels in downstream sediment sample SS301. The FS states that inorganic contaminants in sediment samples cannot be distinguished from ambient concentrations of inorganics in natural soils, and therefore are not considered significant. The statement about the influence of Highway 12 on organics in sediment refers only to sample SS108, which is taken right under the Highway.

Item 16: The landfill caused chromium contamination of Mutton Creek based on sample WS108 (downstream of landfill).

Response: Chromium was only found in samples WS002 and WS108. Since WS108 is located downstream of the landfill, and at the Highway 12 intersection, it's presence is associated with the highway. Sample WS002, on the other hand, is the surface water seep at the landfill, hence it's presence is associated with the landfill.

Item 17: It is unusual that high levels of total dissolved solids do not correlate with high levels of Specific Conductivity.

Response: The TDS figure represented data from the phase II sampling effort. The conductivity data was from phase III. As previously mentioned, the same wells were not sampled in each phase. In fact, only 3 wells were in common between the two phases. Therefore, these figures do not correlate well because of insufficient data.

Item 18: Conductivity from Figures 4-3 and 3-14 are inconsistent.

Response: The limits shown in Figure 4-3 are approximate areas of high conductivity based on specific conductivity measurements in phase I, and the geophysical work also completed in phase I. Figure 3-14 shows conductivity for specific well locations. It also incorporates additional well locations (400 series) not present in phase I.

Item 19: The FS states that Lake Bredeen (Mud Lake) could be impacted by the Wauconda site. This is unlikely because it is 1500 feet upstream of the landfill.

Response: Mud Lake is northeast of the site in the direction of ground water flow. Mud Lake is the upstream source of Mutton Creek, but it is downgradient of the site based on ground water flow. There is a potential that contaminated ground water could recharge this lake.

Comment 6: WTG/CRA concur with the conclusion of the FS that the existing data base does not suport implementation of alternatives #1 through #5.

Item 1: Alternatives 3, 4, and 5 involve ground water pumping and treatment to address organic compounds in ground water, yet the treatment methods are not for the organics, but for high iron which is naturally occuring.

Response: The need to pump and treat is based on creation of a hydraulic barrier around the fill to prevent future contaminant migration, and the need to withdraw from the groundwater the contaminants already identified. The treatment process emphasizes metals removal to meet State of Illinois discharge requirements. The biological treatment is needed to remove the high levels of COD identified at the site.

Item 2: Table 1-1 does not define the level of benefit of positive aspects or the cost of a negative aspect.

Response: Table 1-1 is only an overview of major points which each alternative must be reviewed against. This review is required by current FS guidance. Cost/Benefit analysis comes in selecting the most cost effective alternative.

Item 3: The FS states that perimeter wells must be used to measure the effectiveness of capping on reducing contaminant migration, yet many of the compounds detected were only slightly above detection. Hence, data obtained from a performance monitoring program will not likely provide evaluation of remedial performance.

Response: Long term monitoring will always be required regardless of the chosen alternative. Should the alternative fail, the monitoring of ground water will detect any problems.

Item 4: A slurry wall is not a technically effective solution unless it can be keyed into the aquiclude. This is recognized by EPA in the FS.

Response: The Agency recognizes the shortcommings of this alternative. It was still important to review if reduction in groundwater flow due to a slurry wall is cost effective compared to other alternatives.

Item 5: Figure 4-3 shows a ground water recovery system based on conductivity. Since conductivity does not represent a public health concern, the recovery system should be based on chemical compounds which pose an unacceptable risk to human health and/or the environment.

Response: The health risk posed by contaminants in ground water is what triggers the ground water pump and treat alternatives. They minimize any future release by creating a hydraulic barrier. Figure 4-3 shows general well locations around the site perimeter, and off-site in areas where contaminants are suspected. This is a generalized figure. The FS further explains that during the design phase, refinements would be required such that the figure would be altered.

Item 6: The conventional treatment technologies presented do not address the organic compounds. They are treated only through conventional treatment mechanisms.

Response: This point has already been covered in item 1 above.

Comment 7: "The FS ignores other potential sources of groundwater contamination."

CRA states in their report that other sources of contamination may be a) an abandoned dump southeast of the site, b) commercial operations on the landfill site property, c) argicultural areas, d) residences (self-contaminated wells).

Response: The scope of the original RI was to determine the releases as a result of the landfill. However, the Agency will establish suitable background wells in the subsequent investigation phase.

Comment 8: "Alternative #7 consists of typical closure measures required of sanitary landfill operators. Cap repairs are the construction of a security fence are not justifiable interim response measures if the leachate seeps are repaired and maintained."

Response: CERCLA allows the Agency to take any measures which are protective of public health, welfare and the environment. The actions recommended are minimal measures which must be taken regardless of the final ground water remedy. It is a contradiction to say that these measures are required practices, but then to say that they are not justified. The FS further describes the justification and benefits of these actions at this time.

Attachment 1: Summary of public meeting for Feasibility Study

On August 14, the public meeting was held to review the feasibility study and recommended interim remedy. No formal comments were made during the meeting. The following questions were answered.

Q: Why not just connect us to the municipal water supply since good water quality (drinking water) can't be guaranteed?

A: Since no one is currently drinking contaminated water there is no justification for extention of municipal water supply. If, in completing the groundwater investigation, safe drinking water cannot be insured, the municipal system may be extended.

Q: What if we don't want municipal water?

A: Residents will not be forced to hook up if municipal water is extended; however, individual monitoring of homes will be discontinued.

Q: How often will homes be tested?

A: Every 6-8 months while investigation continues. This means at least twice before the investigation is complete.

Q: Has the pump station on Barbara Lane been tested?

A: There are several monitoring programs going on within the community. The water in the pump station is part of the municipal system. As such it is subject to routine monitoring under drinking water regulations. The Lake County Public Health Department also has a drinking water monitoring program for residents in the area on groundwater.

Q: Is funding available for further work?

A: The project may be slowed down due to problems with reauthorizing the program.

Q: About two years ago there was an article about a resident having contaminated water in this area, was it due to the landfill?

A: The resident in question would not allow access for resampling to confirm any contamination. Since then, the resident has sealed the well, and constructed a deep well. We will never know if the problem was site specific or related to the landfill.

Q: How long before contamination problems develop in the deep aquifer?

A: Contaminants are not yet well defined in the upper aquifer. Geologic relationships between the upper and lower aquifer need additional investigation in order to completely answer that question.

Q: Is anyone being sued for this problem? How can an unpermitted landfill exist?

A: Solid waste disposal regulations did not exist when this landfill began operation. The newer portion of the landfill (9 acres) was permitted. However, during the cost recovery process, the owner and generators will be held liable for costs.

Q: What is the priority on this site?

A: There isn't a particular order for site investigations. As funds become available investigations begin on new sites.

Q: Why do investigations take so long? The beauacratic process is so frustrating for residents living near the site.

A: Before taking any action there must sufficient data to justify the action. The "operable unit" interim remedy is a limited action which can be taken now. Since the potential costs of remediation are so high, the additional investigation will be time well spent.

Q: Can the site be fenced before winter?

A: The Corp of Engineerings is responsible for design. They won't have a constractor procured by winter. The process of bidding contracts to insure fair business practices is a slow but necessary step. The proposed actions will not be visible at the site until the summer of 1986 at the earliest.

Attachment 1 — Letter from Bruce Kestner

BARRINGTON TREE EXPERTS

BARRINGTON, ILLINOIS

SPRAYING - PRUNING - FEEDING

We Supply and Transplant Large Trees

8-16-85

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Dear Cindy,

It was nice meeting you at the township meeting in Wauconda.

Jane & I would like you to enter our comments to the public record regarding the clean up of Wauconda Sand & Gravel Landfill.

We were hoping along with the rest of the residents on Garland Rd for more definitive action but probably can understand better than anyone else why it must be a slow process. The fact that we would want the EPA to be certain of what action it would take, rather than take a course that may not be correct or may need to be implemented time & time again. Our apprehension regarding this delima comes from the fear that nothing will be done at all. Common sense however tells us that the EPA would not in good conscience allow this to happen.

People who are not involved directly do not know the horror we felt in 1981 when we were told our water was polluted nor did they have to sit water from family members etc for six months while this

drinking water. The main cause of the cancer rate was linked to diesel fuel and finding that our bodies ended up because of the pollutants. We were told that these rates could not have come from a source but the landfill. Any parent who has children could empathize with how we feel about our children, not knowing. Like, they are not sure of knowing if they will see future effects. That is the primary reason that we want the job to be done right & are willing to be patient.

So far, the personnel from the EPA have been great & most working to dealing with us both is why we feel that they are doing the best they can now. Please help us remain aware of any progress.

Thank you
Tom & Jane Brown
28911 Garland
Escondido Ill
60084
312-381-0757

APPENDIX A

SPECIFIC COMMENTS

The following presents specific comments on the FS which are related to the comments discussed within the text of this report.

THE CONDITIONS AT THE WAUCONDA LANDFILL ARE TYPICAL OF SANITARY LANDFILLS THROUGHOUT THE COUNTRY

1. Page 10-1 - EPA state "The problems at Wauconda are not severe (i.e. low levels of contaminants in the groundwater and few people affected or threatened by contaminated groundwater) when compared to other NPL sites". These conditions represent a typical Sanitary landfill.

THE DATA COLLECTED TO DATE DOES NOT SUPPORT THE CONCLUSION THAT A HAZARDOUS 'CONTAMINANT PLUME' IS EMANATING FROM THE WAUCONDA SITE

1. Page 1-4 - The second paragraph identifies a "contaminant plume". This comment should be addressed as per Section 3.2 of the text of this report.

2. Page 1-8 - "contaminated groundwater plume area" (see Section 3.2 of text).

   The above comments are further supported by comments discussed hereafter.

BASED ON EXISTING DATA, LANDFILLED WASTE APPEARS NOT TO BE BURIED IN THE UPPER AQUIFER

1. Page 1-2 - "groundwater in the upper aquifer generally flows through the landfill" (see text Section 3.3)

2. Page 1-2 - CH2M-Hill contend that contaminated groundwater is discharged to Mutton Creek. However, the groundwater quality which discharges to Mutton Creek is not defined.

3. Pages 3-1 and 3-11 - CH2M-Hill contend that the bottom of the landfill is 730 ft. AMSL (See text Section 3.3).

4. Pages 1-1 and 3-1 - The volume of waste of 5.4 million C.Y. is based on an assumed bottom elevation of 730 ft. AMSL and is subject to revision (see text Section 3.3).

THE INTERPRETATION OF GROUNDWATER FLOW DIRECTION IN THE FEASIBILITY STUDY IS NOT SUPPORTED BY THE DATA BASE

1. Page 3-10 - Figure 3-5 shows a water level of 760.0 for OW404. This should be 768.0 based on Table B-9 of the RI Supplement. Similarly, well G302 shows a water level of 72.3. This should be 772.3. The 773 contour should be drawn south of G302. The 400-Series well locations are inaccurately located on Figure 3-5 and all other figures. The proper location of these wells will alter the groundwater contours presented. The date which water levels were taken are not noted on the figure.

2. Page 3-22 - CH2M-Hill indicate that "when leachate mixes and migrates with groundwater, the direction and extent of migration can often be investigated by measuring the conductivity of groundwater". The elevated conductivity measurements (>1000 mhos) presented on Figure 3-14 are consistent with groundwater flowpaths defined by CRA in the Phase II Data Assessment Report and are inconsistent with the groundwater flowpaths presented by CH2M-Hill in Figure 3-10 of the FS.

3. Page 5-5, 5-6 - The existence of a 'plug' of impervious material in the northeast corner of the site is not supported by the geologic data. Borings located at 406 and 407 indicate that the Upper Aquifer is continuous through this area and will permit unrestricted movement of groundwater in a northerly direction.

THE OVERALL PRESENTATION OF DATA IN THE GROUNDWATER QUALITY DATA BASE IS MISLEADING

1. Page 3-9 - Table 3.3 states that dieldrin, 4,4-DDD and endrin were detected in groundwater sampled from wells OW408, OW403, OW404, OW405 and OW406. These pesticide compounds were not found at these wells.

2. Page 3-11 - CH2M-Hill recognize that turbidity of groundwater samples can potentially exaggerate contaminant concentrations. However, turbid, unfiltered samples are used for data assessment in Table 3-1. Also, the RI Supplement report does not report the clarity of samples taken.

3. Page 3-18 - Table 3-1 - The EPA primary drinking water standard of 50 ug/L should be used as the acceptable level of arsenic in groundwater.

4. Page 3-13 - Figure 3-6 - Wells G102, G105, G305A, G306, G307 and G308 do not monitor Upper Aquifer groundwater quality. These wells monitor groundwater within the silty clay formation which overlies the Upper Aquifer.

5. Page 3-17 - Figure 3-10 erroneously includes OW403 and G114 as having organic contamination above the 10^{-6} cancer risk criteria.

6. Page 3-18 - On Table 3-1 CH2M-Hill have erroneously included the following compounds which were below criterion. These are:

   (a) G114-Vinyl Chloride
   (b) G301D-Trichloroethene
   (c) OW403-Vinyl Chloride

   Also, eligibility for many of the listed compounds and wells shown on Table 3-1 is questionable (see Section 3.5 of text).

7. Page 3-18 - Table 3-1 should note that well OW401 is upgradient of the landfill. EPA indicate in the RI Supplement Report that OW401 is not representative of background groundwater quality. It was originally intended to drill OW401 south of the landfill site. However, property access was not available. EPA have failed to note that prior to drilling well OW401 EPA verbally agreed to the location in the field and agreed that it would be representative of background water quality.

8. Page 3-18 - Table 3.1 presents many compounds which are above cancer risk or health criteria. The table is misleading since it includes any compound which exceeded a criteria during only one of the three sampling rounds. If Table 3.1 were to be rewritten in consideration of the representativeness of the data, more than half of the entries could be eliminated (also see Section 3.5).

9. Page 3-21 - CH2M-Hill's presentation of 'Significant Findings' (specifically the last four points on the page) is misleading since it does not consider the representativeness of the data (see Section 3.5 of text).

10. Page 3-21 - The CH2M-Hill data assessment makes no attempt to evaluate the impact of the Wauconda landfill on groundwater quality. For example, contamination at downgradient wells are not differentiated from contamination at cross-gradient or upgradient wells.

11. Page 3-21 - EPA should note that contamination found at wells G104 and G311A are not downgradient from the Wauconda Landfill and are representative of background groundwater concentrations. It should be further noted that well G311A is potentially downgradient of an abandoned dump site located south of Bonner Road and east of Garland Road.

12. Page 3-21 - CH2M-Hill use data generated by CRA for pesticide analysis. However, the remaining data generated by CRA has been selectively excluded.

13. Page 3-21 - CH2M-Hill refer to samples 'split' with CRA. These samples should be referred to as 'duplicate' samples since they were collected independently of CRA samples but at the same time.

14. Page 3-27 - CH2M-Hill contend that surface water contamination is occurring based on Phase I data but failed to further investigate surface water during the supplemental RI. Based on Table 3-2, the only compound impacting Mutton Creek which could possibly be associated with the landfill is Nickel.

15. Page 3-29 - CH2M-Hill contend that contamination of Mutton Creek could be generated by erosion of contaminated surface soils. On the same page it is indicated that sediment samples contain insignificant levels of inorganics. On Page 3-30 it is concluded that volatile organic contamination of sediments may have originated from Highway 12.

16. Page 3-29 - CH2M-Hill contend that the landfill caused Chromium contamination of Mutton Creek based upon sample WS108. This is not supported by samples WS109 or WS301 or WS110 which were collected in Mutton Creek at the landfill and immediately downstream of the landfill.

17. Page 3-25 - It is unusual that high levels of total dissolved solid do not correlate with high levels of Specific Conductivity.

18. Page 4-12 - The area of elevated conductivity (greater than 1,000 umhos) shown on Figure 4-3 is inconsistent with Figure 3-14.

19. Page 5-16 - CH2M-Hill contend that Lake Bredeen could potentially be impacted by the Wauconda site. This is unlikely since Lake Bredeen is located 1500 feet upstream of the landfill.

WTG/CRA CONCUR WITH THE CONCLUSION OF THE FS THAT THE EXISTING DATA BASE DOES NOT SUPPORT IMPLEMENTATION OF ALTERNATIVES #1 THROUGH #5

1. Page 1-4 - Alternatives 3, 4 and 5 involve groundwater pumping and liquids treatment. The motive to recover and treat groundwater is to address organic compounds in groundwater. However, the proposed treatment method does not specifically address treatment of organic compounds. The treatment system primarily involves removal of iron from groundwater which is present at high background concentrations and is unrelated to the landfill site.

2. Page I-8 - Table 1-1 does not define the level of benefit of positive aspects or the cost of a negative aspect.

3. Page 4-6 - In the fourth paragraph EPA indicate that perimeter groundwater monitoring wells will be used to measure the effectiveness of capping on reducing contaminant migration. In order to evaluate the effectiveness of any remedial action a firm baseline must be established of the chemical parameters in groundwater. Many of the chemical compounds detected were only slightly above detection or were below limits of accurate quantification. Hence, data obtained from a performance monitoring program will most likely be unable to provide an evaluation of remedial performance.

4. Page 4-6 - Alternative 2 which involves a slurry wall is not a technically effective solution unless the slurry wall can be keyed into the Aquiclude. This is recognized by the EPA on page 4-10 where the EPA indicate that "contaminants could escape beneath the proposed slurry cutoff on the northern, western and eastern ends of the landfill".

5. Page 4-12 - Figure 4.3 provides a schematic illustration of the groundwater recovery system. The area of groundwater recovery proposed is based on an assumed contaminant plume defined on the basis of specific conductance. The groundwater recovery and treatment alternative should have, as an objective, the recovery and treatment of chemical compounds which pose an unacceptable risk to human health and/or the environment. Specific conductance does not represent a public health concern.

6. Page 4-14 and 4-15 - The conventional treatment technologies presented do not address organic compounds. The only treatment provided occurs indirectly through conventional treatment mechanisms.

Appendix C: Metals calculations for Freshwater and Aquatic Life Criteria [a]

1. Cadmium 1980 24 hr. maximum: $e^{(1.05(\ln (\text{Hardness}))-8.53)}$
2. Cadmium 1980 Anytime maximum: $e^{(1.05(\ln (\text{Hardness}))-3.73)}$
3. Cadmium 1985 4 day ave.: $e^{(.7852(\ln (\text{Hardness}))-3.490)}$
4. Cadmium 1985 one hour ave.: $e^{(1.128(\ln \text{Hardness}))-3.828)}$
5. Lead 1980 24 hr. maximum: $e^{(2.35(\ln (\text{Hardness}))-9.48)}$
6. Lead 1980 Anytime maximum: $e^{(1.22(\ln (\text{Hardness}))-.47)}$
7. Lead 1985 4 day ave.: $e^{(1.266(\ln (\text{Hardness}))-4.661)}$
8. Lead 1985 one hour ave.: $e^{(1.266(\ln (\text{hardness}))-1.416)}$
9. Nickel 1980 24 hr. maximum: $e^{(.76(\ln (\text{Hardness}))+1.06)}$
10. Nickel 1980 Anytime maximum: $e^{(.76(\ln (\text{Hardness}))+4.02)}$
11. Zinc 1980 Anytime maximum: $e^{(.83(\ln (\text{Hardness}))+1.95)}$
12. Silver 1980 Anytime maximum: $e^{(1.72(\ln (\text{Hardness}))-6.52)}$

a. Hardness = 322.0 mg/l

4 September 1985

Ms. Cindy Nolan
U.S. EPA - Region 5
230 South Dearborn
Chicago, IL 60604

Dear Ms. Nolan:

I am returning your topographic map of the landfill site in Wauconda. The flood-prone areas shown at and near the site on the Flood Insurance Rate Maps for Wauconda and unincorporated areas of Lake County are drawn from the Hydrologic Investigations Atlas HA-207, Floods in Wauconda Quadrangle, Northeastern Illinois, Allen, 1966. I am enclosing copies of the pertinent portion of that map and of the profile for Mutton Creek printed with the map. The profile corresponds to the flood of record on Mutton Creek which occurred in April 1960. My best estimate of the flood elevation along the northern boundary of the landfill site ranges from 767 feet at the northwest corner to 768 feet at the middle and then to 778 feet at the northeast corner. Comparison of these flood elevations to the site topography demonstrates that there is no flood hazard for the landfill site. If you need additional information or a more formal response, please let me know.

Respectfully yours,

Mike Bender

G. Michael Bender
Associate Engineer
Illinois State Water Survey
2204 Griffith Drive
Champaign, IL 61820
Phone: (217)333-0447

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